



# Effective Factors of Information Therapy in Clinical Decision Support for Immunodeficiency Disease by Fuzzy Delphi Method: A Descriptive Study

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## Abstract

**Objectives:** The present study aimed to identify the dimensions and components of information therapy from the point of view of physicians and officials using fuzzy Delphi technique.

**Materials and Methods:** This applied research was conducted by a descriptive method (qualitative content analysis document study and fuzzy Delphi method) from 2019 to 2020. The thirty two valid document studies were used to examine the sources and extract the required components of the therapeutic information variable. The content analysis method was used to classify effective components. Participants in this study were 10 experts. Qualitative content analysis of the data obtained through software 2018 MAXQDA.

**Results:** Two hundred and seventeen primary codes were extracted, reduced to 112 codes after continuous review, and finally these codes were divided in two main themes (categories), including: A- Information; health literacy (1- Information acquisition, 2- Information identification, 3- Information sharing, 4- Awareness-raising, 5- Information needs, and 6- Health knowledge), B- Treatment; health services (7- Patient satisfaction, 8- Information-seeking behavior, 9- Treatment method and cost, 10- Participatory care and information use, 11- Health education, and 12- Disease prevention).

**Conclusions:** The results showed information therapy approach in medical centers of the country, as a dynamic platform to support clinical decisions of specific diseases (such as immunodeficiency diseases), requires long-term policy to improve research and educational activities. The services of the medical staff will be possible through the establishment of factors and effective elements in retrieving and accessing up-to-date information by the physician and the patient, and as a result, promoting health knowledge in this field.

**Keywords:** Information therapy, Health literacy, Health care, Immunodeficiency diseases, Fuzzy Delphi

## Introduction

Medicine is an information-based science. Physicians face many questions during patient care and finding high-quality evidence provides a good opportunity to improve care (1). A significant part of the clinical practice involves gathering information about patients, processing information, and acting on it so that physicians can act at the right time for the patient (2). Therefore, the implementation of the present study entitled “information therapy”, which is in line with the right of physicians to access appropriate clinical information to make critical decisions, is undeniable (3), especially despite today’s problems such as high costs, low quality of services, burnout physician and patient dissatisfaction, and inefficient information management practices (4). Undoubtedly in such situations, access to the best evidence (5), providing reliable information (6), and up to date (7) not only leads to fewer referrals, better diagnosis, and more effective treatments (4), reduction of medical errors (5-10) but also leads to more patient satisfaction.

Major research has not been done to understand the nature of clinical methods (4,7), to identify needs, as well as physicians’ information retrieval behavior and ways to overcome major barriers to using a wide range of databases and archives. (11,12) therefore, such researches are necessary have done to support clinical decisions (13,14). And its effect on improving the performance of medical centers has not been addressed. Dell Fuel and co-workers reviewed articles up to 2011 and addressed clinical questions raised by physicians, including nurses, physician assistants, medical assistants, physicians, dentists, and administrators. Therefore, a systematic investigation is necessary to establish a therapeutic information approach, especially in pediatric medical centers. According to the patients’ rights charter, receiving accurate information from physicians and individuals involved in the diagnosis, treatment, prognosis, and disease control is the patient’s right (15). Today, studies conducted in developed countries show that one of the five main factors of their success in implementing patient education programs is organizing

Received 14 December 2021, Accepted 10 April 2022, Available online 22 August 2022

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## Key Messages

- ▶ Patients will seek information and use it effectively based on the progression of their disease.
- ▶ Self-management of diseases is possible only if you have the right information at the right time
- ▶ Information therapy is the process of increasing the conscious control of the disease, its active management, the lack of disease progression, and consequently the reduction of secondary costs resulting from the treatment of complications caused by the disease.
- ▶ Physicians should be aware of patients' information needs, how to choose information sources, factors influencing this choice, and how to use this information.

patient education as a form of care (16). Some studies have shown that patients who received medical information from service providers were significantly more satisfied with the care provided (17) and received more effective self-care training. Patient education is generally a tangible economic justification that saves between US\$ 3 and US\$ 4 on the mean (18). Accordingly, in some studies, physicians' clinical information retrieval behavior during patient care is up-to-date and expanded (19-21).

The source of many diseases is the lack of a healthy lifestyle and lack of self-care. The current century is the century of diseases caused by an unhealthy lifestyle. Health organizations are responsible for achieving self-care. Self-care is the first line of health that reduces costs and promotes health (22). The dimensions and components obtained from the fuzzy Delphi approach can help health care providers and managers increase patients' self-care information in the medical information system (23). Pediatric Medical Center in Tehran is one of the largest and most reputable medical education centers in Iran that treats many patients and clients from all over the country and the region every year. Improving patient satisfaction and increasing public health literacy is one of the goals pursued by this center. Therefore, providing medical information services can be a positive step towards achieving this goal. This study aimed to identify and rank the factors influencing medical information supporting clinical decisions on immunodeficiency diseases (fuzzy Delphi method).

### Materials and Methods

The present study was conducted at Children Medical Center (CMC), Tehran, Iran, from 2019 to 2020 by a descriptive method, including two stages of qualitative content analysis (Stage 1) and the fuzzy Delphi method (Stage 2). At first, the document studies were used to examine the sources and extract the required components of the therapeutic information variables. The 33 valid and published studies in this field were found. Then by using the fuzzy Delphi method and through the following rounds, the opinions of experts about their agreement with the criteria of the proposed model were obtained, and

their agreement has expressed through verbal variables such as strongly disagree, disagree, have no opinion, agree, and strongly agree (Figure 1).

Delphi is a systematic approach or method of research to extract opinions from a group of experts on a topic or question or reach a group consensus through a series of questionnaire rounds while maintaining the anonymity of respondents and feedback to panel members. The advantage of the fuzzy Delphi method is in considering each of the ideas and integrating them to reach a group agreement (24). Delphi was assessed using the Likert scale 1 questionnaire with a 5-point scale. The Likert scale is one of the most common scales for measuring attitudes and includes a set of phrases in which respondents rate their agreement with each of the phrases in a range usually from one to five (25).

These variables are defined as follows (using the Minkowski formula) in fuzzy numbers according to Table 1 and Figure 2.

$$X = m + \frac{\beta - \alpha}{4}$$

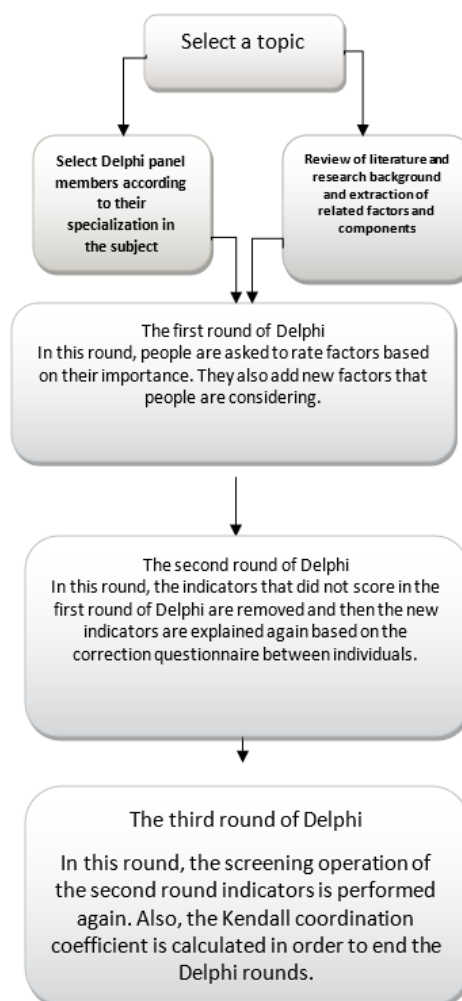
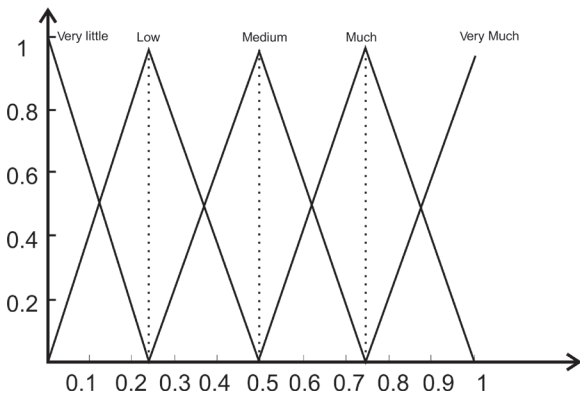


Figure 1. Rounds of Delphi Method in This Study.

**Table 1.** Triangular Fuzzy Numbers of Verbal Variables (28)

Verbal Variables	Triangular Fuzzy Numbers	Definite Fuzzy Numbers
Very much	(1, 0.25, 0)	0.9375
Much	(0.75, 0.15, 0.15)	0.75
Medium	(0.5, 0.25, 0.25)	0.5
Low	(0.25, 0.15, 0.15)	0.25
Very little	(0, 0, 0.25)	0.0625



**Figure 2.** Triangular Fuzzy Numbers for Five-Point Likert.

In the first round, the initial model of the research literature coding, along with a description of the components, criteria, and sub-criteria, was sent to the group of experts, and a survey was conducted to obtain their agreement or disagreement with each component. Their suggestions and corrections were summarized as follows. According to the proposed options and linguistic variables defined in the questionnaire, the results of the study were calculated using the fuzzy mean of each of the dimensions and components according to the following relationships:

$$A_i = (\alpha_1^{(i)}, \alpha_2^{(i)}, \alpha_3^{(i)}), i = 1, 2, 3, \dots, n$$

$$A_{ave} = (m_1, m_2, m_3) = \left( \frac{1}{n} \sum_{i=1}^n \alpha_1^{(i)}, \frac{1}{n} \sum_{i=1}^n \alpha_2^{(i)}, \frac{1}{n} \sum_{i=1}^n \alpha_3^{(i)} \right)$$

Kaufmann and Gobata invented the fuzzy Delphi method in the 1980s. This method is used to make decisions and consensus on issues in which the goals and parameters are not clearly defined. Many problems in decision-making are related to incomplete and inaccurate information. Also, the decisions made by the experts are based on their competence and are highly subjective. Therefore, it is better to display data with fuzzy numbers instead of definite numbers. The implementation steps of the fuzzy Delphi method are a combination of implementing the Delphi method and performing analyzes of information using the definitions of fuzzy set theory. The most important differences between the fuzzy Delphi method and the Delphi method are that experts usually present their opinions in the form of verbal variables in the fuzzy Delphi method. Then the mean of the experts' opinion

(numbers provided) and the amount of disagreement of each expert from the mean are calculated. This information is sent to the experts to receive new opinions. This process continues until the mean of the fuzzy numbers is sufficiently stable. In addition, if a study under the supervision of a group of experts is necessary, theories can be calculated by calculating the distance between the triangular numbers. Identified the experts based on fuzzy relationships in similar groups and sent their information to the experts in question (26-29).

The sampling strategy in this research and the qualitative part was in the form of a snowball (chain). Based on this, the qualitative population of the present study is 10 experts and specialists in the field of immunodeficiency diseases (immunologists) in the country, based on purposive sampling and snowball method in several stages. Preliminary coding and qualitative content analysis of the data obtained through software 2018 MAXQDA was done. In this research, codes, categories, and sub-categories were identified to extract the dimensions and components and formulate the initial conceptual model using the research literature.

**Results**

Delphi panel members were immunologists who mainly specialized in allergy and clinical immunology, medical immunology, and pediatric allergy. Of them, 50% were associate professors, and 50% were full professors. They had worked for nearly 14 to 30 years (Table 2).

**The First Stage of the Delphi Survey**

In the initial model of the research, literature coding was sent to the group of experts with a description of the themes, classes, and subclasses, and a survey was conducted to determine whether they agree or disagree with each of the components. Their suggested and corrected comments were summarized as follows: 217 primary codes were extracted from the data obtained from the study of texts and sources, reduced to 112 codes after continuous review, and finally, these codes were divided into the form of 2 main themes (2 categories) including: (A) information; health literacy (1- Information acquisition, 2- information identification, 3- information sharing, 4- awareness-raising, 5- information needs, and 6- health knowledge) and (B) treatment; health services (7- patient satisfaction, 8- information-seeking behavior, 9- treatment method and cost, 10- participatory care and information use, 11- health education, and 12- disease prevention). In the Delphi method, the sampling method was purposeful to achieve data saturation, 10 experts and researchers in the field of immunodeficiency diseases were responded (Table 2). In addition, the extracted codes from research literature, extracted criteria and components from research literature, as well as the difference between the experts' views on the survey, the health information notification system of the country was in first and second

**Table 2.** Demographic Information of Delphi Panel Members

Academic positions	Field of Study	Experience work experience (y)
Associate professor	Allergy and clinical immunology	14
Associate professor	Allergy and clinical immunology	14
Associate professor	Pediatric allergy	15
Associate professor	Allergy and clinical immunology	16
Assistant professor	Allergy and clinical immunology	17
Professor	Medical immunology	18
Professor	Pediatric allergy	25
Professor	Pediatric allergy and Immunology	26
Professor	Clinical immunology	29
Professor	Allergy and clinical immunology	30

stages listed in Tables 3, 4 and S1, respectively. Figures 3 and 4 shows the mean of the experts' views from the first survey for the dimensions and components of the research. The highest rate of agreement between experts in the first stage in the dimension of information was health literacy related to "information needs" (mean=0.867) and in terms of treatment; health services were characterized by "information-seeking behavior" (mean = 0.810). Also, among the dimensions, the highest level of agreement was related to the information dimension; health literacy (mean =0.812) and then treatment; health services (mean=0.7592).

### The Second Stage of the Delphi Survey

In the second stage of the survey, the experts answered all the questions as in the first stage, which is described below. The results of counting the answers of the second stage of the Delphi survey in Figures 3 and 4 have shown that the fuzzy mean of each of the components and dimensions, including the highest rate of expert agreement in the second stage of the survey, is in the information dimension; health literacy related to "information needs" (mean=0.874), in terms of treatment; Health services "health education", (mean=0.844). Also, among the dimensions, the highest level of agreement is related to the

**Table 3.** Extracted Codes From Research Literature

Code	Authors	Year	Sources
P1	Mohammadesmaeil and Kianmehr (30)	2021	Data mining as an intangible model of information therapy and seeking behaviors in immune deficiency disease specialists
P2	Khajeali Jahantighi et al (23)	2020	Identifying dimensions and components of self-care informing of patients in medical information system of Iran by fuzzy Delphi approach
P3	Firoozi et al (31)	2019	A study of the benefits and limitations of self-care education through social networks and telemedicine in cancer patients.
P4	Tahvildarzadeh et al (32)	2019	Information seeking behavior of patients with breast cancer and influential factors
P5	Bahrami Moghadam et al (33)	2019	The role of media in learning self-care teachings in diabetic patients
P6	Afraz and Rasouli (34)	2018	The role of mobile health software in facilitating the self-care process
P7	Ahmadi and Izadkhah (35)	2018	A study of the role of media in community health development: a review study
P8	Izadkhah et al (36)	2018	Study of effective factors in promoting health literacy through information and communication technology.
P9	Mousavi et al (37)	2018	Information literacy study of nurses working in public hospitals in Boroujerd city.
P10	Mehdipour et al (38)	2018	A study of the relationship between biomedical informatics and health information technology
P11	Rasoul et al (39)	2018	The impact of information and communication technology in the health system
P12	Nasrollah Nejadtoj et al (40)	2018	The effect of virtual education based on the dimensions of health literacy in patients with type 2 diabetes
P13	Duniaei et al (41)	2018	The role of information and communication technology in promoting individual and social health
P14	Jafarzadeh and Iraqi Fadaei (42)	2017	Rooting studies in information behavior studies using the bibliometric approach
P15	Famil Rouhany and Mousavi (43)	2017	Media literacy and information behavior in cyberspace
P16	Bigdeliy et al (44)	2016	Professional information seeking of emergency medical technicians in Bushehr city
P17	Papi et al (45)	2014	Knowledge and use of electronic information resources by physicians in teaching hospitals
P18	Zeinali et al (46)	2014	Effect of health information prescription (HIP) on caregiver's self-care ability
P19	Yarahmadi et al (47)	2014	The effect of face-to-face information therapy on glycosylated hemoglobin (HbA1C) levels in type 2 diabetic patients

Table 3. Continued

Code	Authors	Year	Sources
P20	Yousefi et al (48)	2014	Survey of researchers' information seeking behavior of Razi Vaccine and Serum Research Institute.
P21	Mojiri et al (49)	2014	Evaluating the knowledge of physicians about and their usage of Iranian National Medical Digital Library in Isfahan University of Medical Sciences, Iran.
L1	Demergazzi et al (50)	2020	Information needs and information-seeking behavior of Italian neurologists: Exploratory mixed methods study
L2	Ilogho et al (51)	2020	The role of librarians in health information provision for depression reduction
L3	Daei et al (1)	2020	Clinical information-seeking behavior of physicians: A systematic review
L4	Nel (52)	2020	Information behavior and information practices of academic librarians: a scoping review to guide studies on their learning in practice
L5	Tahmasebi et al (53)	2020	The educational role of clinical informationist on improving clinical education among medical students: Based on Kirkpatrick model
L6	Zare-Farashbandi et al (54)	2019	Involving clinical librarians in clinical settings: Skills, roles, advantages, and barriers. <i>Journal of Hospital Librarianship</i>
L7	Schweikhard et al (55)	2018	The impact of library tutorials on the information literacy skills of occupational therapy and physical therapy students in an evidence-based practice course: A rubric assessment
L8	Tury et al (56)	2015	The information-seeking behavior of distance learners: A case study of the University of London international programs
L9	Nwafor-Orizu and Nwafor-Orizu (57)	2015	Availability and use of health information resources by doctors in teaching hospitals in southeast Nigeria
L10	Amichai-Hamburger et al (58)	2014	The future of online therapy
L11	Oluwaseye (59)	2014	Information needs and seeking behavior of undergraduates in Ajayi Crowther University Oyo State, Nigeria
L12	Boruff and Thomas (60)	2014	Integrating evidence-based practice and information literacy skills in teaching physical and occupational therapy students

information dimension; health literacy (mean = 0.8271), and then treatment; health services (mean = 0.8053).

Also, according to the views presented in the first stage and their comparison with the results of this stage, if the difference between the two stages was less than the threshold, this case was considered very small (0,1) (28), and the poll process was stopped. Table S1 shows the differences between the experts' views on research indicators using the following formula in the first and second stages of the surveys.

$$S(A_{m2}, A_{m1}) = \left| \frac{1}{3} [(a_{m21} + a_{m22} + a_{m23}) - (a_{m11} + a_{m12} + a_{m13})] \right|$$

As shown in Figures 3 and 4, also Table 5, we identified the questionnaire questions in the third round (highlighted indicators). Experts' opinions were saturated at this stage, and all opinions were aligned. Also, in Figures 3 and 4, the highest rate of experts' agreement in the third survey in the dimension of "information; health literacy" component related to "information needs" (mean = 0.874), in the dimension of treatment; "health services" component

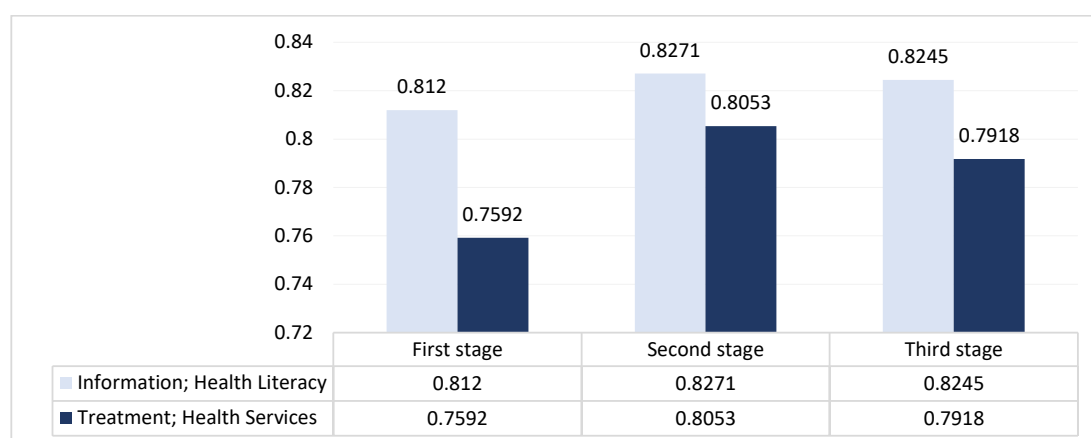


Figure 3. Comparison of Identified Dimensions for Health Literacy and Health Services in the Pediatric Medical Center in the First, Second and Third Stages of Delphi.

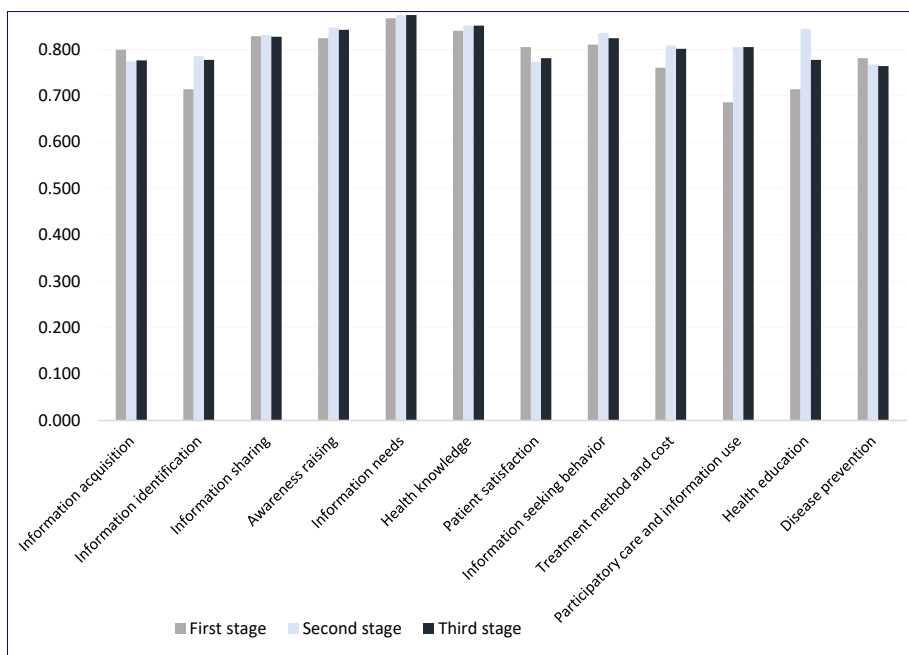


Figure 4. Comparison of Identified Components in the First, Second, and Third Stages of Delphi

“information-seeking behavior” (mean = 0.824), also among the dimensions of the highest level of agreement related to the dimension of information; “health literacy” (mean = 0.8245) and then the level of agreement related to the dimension of treatment; “health services” (mean = 0.7918), which indicates, there was a very close relationship between these two categories.

Figures 3 and 4 show a comparison of the dimensions and components identified in the field of information therapy (“information, health literacy” and “treatment, health services”) in patients with immunodeficiency disease

in the Pediatric Medical Center in the first three stages. The second and third Delphi showed that the numbers in Figure 3 indicated that all comments on information and health literacy were higher than treatment and health services. And then a short distance to “treatment; health services” for immunocompromised patients at the pediatric medical center. The numbers obtained in relation to the “treatment; health services” dimension, in the second stage (mean = 0.8053) and in the third stage (mean = 0.7918), almost show that they overlap in the two final stages slightly lower. However, the “treatment;

Table 4. Extracted Criteria and Components from Research Literature

Dimensions	Components	Sources
<b>A. Information (61)</b>		
	1- Information acquisition	P1, P2, P4, P6, P7, P9, P12, P14, P15, P17, P18, P19, P20, L1, L3, L4, L5, L6, L7, L8, L9, L10, L12,
	2- Information identification	P1, P4, P7, P9, P12, P14, P15, P17, P18, P19, P20, L1, L3, L4, L5, L6, L7, L8, L9, L10, L12,
	3- Information sharing	P1, P2, P5, P6, P7, P8, P10, L1, L2, L6, L7, L10,
	4- Awareness raising	P1, P2, P3, P4, P5, P6, P7, P8, P9, P12, P13, P15, P17, P18, P19, P20, L1, L2, L3, L4, L5, L6, L7, L9, L10, L12,
	5- Information needs	P1, P4, P9, P17, P18, P20, L1, L2, L5, L6, L9, L10, L11,
	6- Health knowledge	P1, P3, P4, P6, P7, P8, P9, P12, P15, P17, P18, P20, L1, L2, L3, L5, L6, L7, L10, L12,
<b>B - Treatment (Health care)</b>		
	7- Patient satisfaction	P1, P2, P6, P7, P12, P17, P18, L1, L3, L10,
	8- Information seeking behavior	P1, P2, P3, P4, P5, P6, P9, P12, P14, P15, P16, P17, P18, P19, P20, L1, L2, L3, L4, L5, L6, L8, L10, L11, L12,
	9- Treatment method and cost	P1, P13, P18, L2, L6, L10,
	10- Participatory care and information use	P1, P2, P3, P4, P5, P6, P7, P9, P10, P11, P12, P13, P17, P18, L1, L2, L3, L5, L6, L7, L9, L10,
	11- Health education	P1, P2, P5, P6, P7, P8, P9, P12, P13, P17, P18, L1, L2, L6, L10, L12,
	12- Disease prevention	P1, P2, P3, P7, P8, P9, P12, P13, P15, P17, P18, L1, L2, L3, L6,

**Table 5.** The Extent of Differences in the Experts' Views in the Second and Third Stage of Information Therapy Survey

Main Row	Indicators	Second Stage Round	Third Stage Round	Dispute
004	People's efforts to obtain information, awareness, and correct and practical knowledge of diseases are necessary to have a healthy lifestyle.	0.9	0.7813	0.11875
006	In the information-based treatment process, the patient's trust in the physician for a better diagnosis of the disease increases.	0.9	0.725	0.175
009	Because identifying and using information changes attitudes and behaviors, informing immunocompromised patients is essential.	0.8563	0.8438	0.0125
010	Information increases the services that can be provided in the country's health network, especially in the pediatric medical center as the scientific center of the country.	0.9	0.88125	0.01875
011	Informing means facilitating the identification and access to the information contained in various sources of medical information by the medical staff.	0.6313	0.63125	0
012	Effective information is effective on the occurrence of appropriate information-seeking behaviors by physicians and patients.	0.7625	0.73125	0.03125
013	Appropriate identification and use of information as part of establishing an information therapy approach is essential.	0.88125	0.88125	0
014	Health information is a bridge between health information and the health behavior of people in the community.	0.5438	0.54375	0
017	Examples of information sharing are the reflection of appropriate feedback in the face of disease	0.8813	0.63125	0.25
019	The creation of appropriate levels of up-to-date sharing information by experts is necessary for establishing of an information therapy approach in the field of immunodeficiency diseases	0.9188	0.8375	0.08125
020	Sharing information with patients as a result of informing alleviates their concerns	0.7313	0.7938	-0.0625
023	Whatever the motivation and purpose of the user in obtaining information, it is to increase awareness	0.775	0.9	-0.125
025	In discussing awareness raising, it is necessary to pay attention to information-seeking behaviors and information needs of physicians and patients.	0.9188	0.8688	0.05
030	Information needs make the decision-making process not based on the principle of probability.	0.6625	0.88125	-0.21875
032	Addressing the need for information in practice prevents the excessive use of health care resources.	0.6625	0.88125	-0.21875
038	Informing and applying health knowledge in practice helps prevent diseases of the immune system	0.8813	0.7625	0.1188
041	Optimal care services help improve the performance of care teams and facilitate them, provide effective feedback to patients, and lead to their satisfaction.	0.5313	0.5438	-0.0125
042	Optimal services of medical staff, in practice, maintain, and improve the patient's health and satisfaction as much as possible.	0.8625	0.88125	-0.01875
048	In the treatment process, medical staff must have a high goal and motivation to seek specialized information	0.9188	0.8813	0.0375
049	In the information-seeking process, gaining health knowledge and skills can only be achieved by attending conferences and workshops.	0.9	0.8438	0.05625
050	Performing the right self-care behaviors, which occur along with the detection and treatment of diseases of the immune system, is a skill lacking in cognition.	0.5313	0.8625	-0.33125
055	It is essential to find resources in the field of working with resources, mastery, and familiarity with the process of acquiring health knowledge.	0.8813	0.8188	0.0625
057	Trying to do the right self-care behaviors is an activity learned in the sick person that removes the public responsibility to maintain the health of themselves, family, and loved ones.	0.8813	0.6625	0.21875
058	Information seeking behaviors and skills are not simply the result of environmental conditions	0.9188	0.78125	0.1375
059	Information-seeking behavior training should be in full accordance with the individual's behavioral characteristics	0.7563	0.900	-0.14375
060	In the process of searching for and accessing information, self-efficacy in patients with immunodeficiency should be closely monitored.	0.9	0.7875	0.1125
061	Doing the right information-seeking behaviors, while creating a spirit of interaction, does not create independence of action in the individual.	0.6625	0.8375	-0.175
063	High self-confidence, due to obtaining correct information in care work, leads to appropriate behaviors for care.	0.9188	0.8375	0.08125
066	The process of self-care information-seeking creates the right motivation and enhances a person's good value.	0.9188	0.76875	0.15

Table 5. Continued

Main Row	Indicators	Second Stage Round	Third Stage Round	Dispute
067	Two categories are completely independent and independent between information seeking and information therapy.	0.6625	0.81875	-0.15625
068	Ignorance of effective information-seeking behaviors and skills is the result of poor medical resources.	0.7313	0.8625	-0.13125
074	Practicing effective information-seeking behavior by physicians is influenced by their mental image of a sense of worth.	0.7313	0.91875	-0.1875
075	Information retrieval helps to develop an individual's knowledge and to identify and identify competencies.	0.8313	0.6625	0.16875
080	Evaluation of symptoms and information are the main goals of reducing treatment costs.	0.6313	0.7875	-0.15625
087	Ignorance and poor self-care impose high costs on sufferers each year.	0.8125	0.7875	0.025
092	The use of information is a vital principle in the promotion of care knowledge and awareness.	0.8625	0.88125	-0.01875
094	The medical staff will apply it by acquiring and acquiring health knowledge.	0.6625	0.8625	-0.2
095	The use of information in the treatment and promotion of health requires the participation of patients in the treatment process, and the performance of appropriate self-care behaviors.	0.8063	0.7875	0.01875
097	The therapist's use of information in therapy stimulates the individual's desire to survive and thrive, and the patient's kindness to himself or herself and others.	0.7875	0.80625	-0.01875
100	Educational interventions require joint training programs.	0.8813	0.7875	0.09375
101	Awareness and self-care can only be achieved through training to avoid risky behaviors.	0.5313	0.79375	-0.2625
103	Educational interventions lead to patient care in the form of a cohesive educational team.	0.8188	0.7875	0.03125
104	Knowledge of how to maintain health and prevent disease leads to improving the lifestyle of immunocompromised patients.	0.8063	0.7875	0.01875
108	Knowing how to maintain health and prevent diseases of the immune system can prevent stress and mental and emotional disorders caused by this disease in a person.	0.6313	0.7	-0.06875
111	Evaluation of health symptoms leads to the adoption of preventive behaviors to reduce disease.	0.7	0.8125	-0.1125

health services” dimension in stage 3 is less distant from the “information; health literacy” dimension than in stage 2. In the “treatment; health services” dimension, the component of “information-seeking behavior” related to diseases in this field (immunodeficiency diseases), in the first stage (mean = 0.810), and in the second stage of the component “health education” (mean = 0.844) and in the third stage, the component of “information-seeking behavior” (mean = 0.824), which indicates the complete saturation of expert opinions and complete overlap of these two stages, also indicated the position and role Information in the health system was general, and in the field of immunodeficiency diseases in the pediatric medical center was particular.

**Discussion**

Comparing the results of this study with previous studies showed that, Gholami et al (62), in their research, found that information is essential for responding to patients and their participation in treatment decision-making and optimal life management. Firooz et al (63) found that finding strategies to improve self-care in patients is

essential. Baghaei et al (64) found that there is a more practical relationship between patients’ characteristics and their level of knowledge with different dimensions of self-care and education in diabetes centers, so more emphasis on making changes, both in knowledge and information behavior, as well as, in improving attitudes are essential to increase people’s sense of self-efficacy. Mohammadpour and colleagues (65) found a significant correlation between health literacy and variables of drug habits and physical activity. Since these cases are very effective in preventing and controlling the disease, education, and promotion of patients’ health literacy should be covered. Value-based health care requires balancing medical outcomes with economic value (66). Clinical educators and researchers need to present thorough economic analyses demonstrating returns on investment and cost-effectiveness to effectively communicate with administrators (67). So, the results of this research would be essential for managers and officials of health care organizations in the future. Using modern health information management systems, efforts should be made to create essential factors, such as; providing accurate and



timely information to the public and providing optimal services to patients more seriously. However, the findings of this research were in line with the results of previous research; it has been as follows:

#### In the Dimension of Information (Health Literacy)

- The indicator of the component of “Information acquisition” has been; *People’s efforts to obtain information, awareness, and correct and practical knowledge of diseases are necessary to have a healthy lifestyle*, which was in line with the findings of previous studies (3,5,64,68).
- For *Information identification*, the best choice was; “In the information-based treatment process, the patient’s trust in the physician for a better diagnosis of the disease increases”, which was in line with the findings of previous articles (3-5,12, 61-64,68).
- For the indicators of the *Information-sharing* component, “Examples of information sharing are the reflection of appropriate feedback in the face of disease”, which was in line with the findings of some researchers (11,12,63,64,69-71).
- For the indicators of the component *Awareness raising*. Expertises’ agreement was related to the index “The motivation and goal of the user to obtain information, whatever it is, leads to increase and awareness”, which was in line with the findings of some studies (8,11,65).
- For the indicators of the component *Information needs*. The highest levels of expertise agreement were related to “Information needs make the decision-making process not based on the principle of probability and Addressing the need for information in practice prevents the excessive use of health care resources”. These items have also been confirmed in previous research (7,62).
- For *Health knowledge*, the best choice was; “Informing and applying health knowledge in practice helps prevent diseases of the immune system”, which was in line with the findings of the previous studies (2,11,14).

#### In the Dimension of Treatment (Health Care)

- The indicators of the “*Patient satisfaction*” component were related to “Optimal services of medical staff, in practice, maintain and improve the patient’s health and satisfaction as much as possible”. Some studies have also confirmed these items (50,62,64).
- For the indicators of the component of *information-seeking behavior*, the first and second ranks are allocated to “Practicing effective information-seeking behavior by physicians is influenced by their mental image of a sense of worth” and “In the treatment process, medical staff must have a high goal and motivation to seek specialized information” respectively. Some research has confirmed these

items (1,5,7,8,12).

- For the *treatment method and cost* component indicators, the expertises’ agreement was related to the index “Evaluation of symptoms and information are the main goals of reducing treatment costs”, which was in line with the findings of other studies (18,66,67).
- The indicators of the *Participatory care and information* component were related to “The use of information is a vital principle in the promotion of care knowledge and awareness, “ which was in line with the findings of previous studies (6,9,10,72).
- The indicators of the Health education component were related to “Awareness and self-care can only be achieved through training to avoid risky behaviors”, which was in line with the findings of some research (16,29).
- The indicators of the *Disease prevention* component were related to “Mere evaluation of health symptoms leads to the adoption of preventive behaviors to reduce disease”, which was in line with the findings of some studies (4,16,64,65).

#### Suggestions

- Therefore, it is suggested that the officials of health and medical organizations of the country provide more seriously the following items: Given the importance of health information and the need for it to be received by patients and their families, as well as the staggering costs of treatment that afflict them, the need for cheaper and more cost-effective treatment strategies is felt.
- Information therapy is the provision of appropriate information at the right time and for the patient, which helps improve the physical and mental health of people in the community and patients.

#### Conclusions

This study showed that the Information therapy approach would be essential for managers and officials of health care organizations in the future. Access to up-to-date information in the medical profession is critical and vital, and the use of this information will significantly impact how patients are treated. Timely access to information in medical resources prevents errors and promotes health services.

Therefore, it is suggested that health and medical organizations use an information therapy approach to provide better medical services and timely decisions based on evidence and information. This approach will help medical professionals to provide optimal services to patients and be informed about modern medical equipment and facilities. Using this approach will reduce medical costs by reducing medical errors and leads to the best evidence-based decision by considering the patient’s preferences in the treatment process.

**Authors' Contribution**

SM designed the study and conducted the research. SM, JGM, and SK monitored, evaluated, and analyzed the result of the study. Further, SM and JGM reviewed the article. All authors approved the final manuscript and take responsibility for the integrity of the data.

**Conflict of Interests**

Authors have no conflict of interest.

**Ethical Issues**

This study was approved by the ethics committee of Tehran University of Medical Sciences, Tehran, Iran (Code: IR.TUMS.VCR.REC.1398.585).

**Financial Support**

This research received no specific grant from any funding agency in the public or commercial sectors.

**Acknowledgments**

We would like to thank the Pediatric Medical Center and the Center for the Development of Clinical Research, Tehran, Iran for their assistance in conducting the current study.

**Supplementary Materials**

Supplementary file 1 contains Table S1.

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